

# Addressing future system's adequacy in Western Balkan 6 countries

*Athens Forum*

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# Content of the presentation

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**1** Introduction: FTI-CL Energy and project scope

**2** Adequacy assessment of WB6

**3** Preliminary policy recommendations

**4** Questions

# FTI-CL Energy is the energy practise of FTI - Compass Lexecon and gathers senior experts across Europe

## Services provided by FTI-CL Energy

FTI-CL Energy is the cooperation of energy experts from FTI Consulting and its wholly-owned subsidiary Compass Lexecon, bringing together highly experienced economists, accountants and industry practitioners.



## FTI-Compass Lexecon at a glance

<b>FCN</b> Publicly traded – NYSE	<b>\$1.4 BLN</b> Market Capitalization
<b>1982</b> Year founded	<b>80</b> Different disciplines
<b>4,600+</b> Employees worldwide	
<b>460+</b> Senior Managing Directors	
<b>2</b> Nobel Laureates	
<b>10/10</b> Advisor to the world's top 10 bank holding companies	



## Focus on our Energy practice

FTI - Compass Lexecon is one of the leading advisory firms for economic and policy analyses in the European energy industry

- Policy and market design
- Investment decision support
- Energy markets modelling
- Financial valuation of assets
- Business model development
- Corporate strategy design
- Economic expertise in commercial litigations

## FTI-CL Energy's senior energy experts in Europe

Jason Mann	Feng Zhao
Alaric Marsden	Lorenzo Coppi
Aris Karcianas	Fabien Roques
Robert Clover	Dmitri Perekhodtsev
Stuart Amor	Emmanuel Grand
Dora Grunwald	Yves Le Thieis
Nicholas Brooks	Blanca Perea
Martina Lindovska	Anton Garcia

■ Main energy offices of FTI-CL Energy  
■ Other FTI Consulting / Compass Lexecon offices

# FTI-CL Energy experts have conducted 280+ projects on regulatory issues and market design and assessment since 2000

 <p>Advised on design of the auctions for entry/exit capacity into the network</p>	 <p>Determined allowed returns on asset base for regulated assets until 2020 for LNG terminals, gas pipelines and storage</p>	 <p>Advised on sale of gas distribution networks, adviser on cost of capital for RIIO. Adviser on RIIO ED1 for CMA inquiry</p>	 <p>Analysed transmission regulation and pricing</p>	 <p>Advised on the market design of gas trading arrangements in the context of Australia becoming a significant LNG hub</p>
<p><b>Anonymous client</b></p> <p>Supported a Swiss hydro producer with the identification of options that would allow a better remuneration of hydro's contribution to security of supply in Switzerland</p>	 <p>Provided support to the Australian Energy market Commission to the charging mechanism and tariff design for use of electricity transmission networks</p>	 <p>Provided economic advice on setting the price control for Gas Networks Ireland</p>	 <p>Advised the gas storage company on regulatory options</p>	 <p>Analysed options for regional coordination in support of system operation and coordination of policies and regulations</p>
 <p>Provided incentive regulation mechanisms of the system operators' quality of supply, for implementation in the new TSO and DSO tariffs</p>	<p><b>Anonymous client</b></p> <p>Analysed regulatory regimes applicable to gas infrastructure in Europe, that could be applied to LNG terminals after expiry of regulatory exemption</p>	 <p>Advised FSA in relation to gas and electricity markets to ensure that the FSA's treatment of energy sector participants is in line with its statutory objectives</p>	 <p>Advised on transmission regulation and incentives for interconnection</p>	<p><b>Anonymous client</b></p> <p>Assessed the possibility to introduce mechanisms supporting a better remuneration of flexibility in short-term power markets</p>

Source: FTI-CL professionals

# FTI-CL Energy's proprietary models have been used in multiple assignments and are relied upon by top industry players

 <p>Prepared a model that forecasts evolution of need for flexibility in the French gas market</p>	 <p>Forecasted the winter-summer NBP spread to 2025 based on our gas fundamental model</p>	 <p>Modelled the French and Western European energy markets and simulated capacity mechanism as part of RTE's formal contributions to the EC</p>	 <p>Econometric modelling to estimate historical impact of RES on electricity markets in Belgium, France, Germany, and the Netherlands</p>	 <p>Developed a model of flexibility supply and demand in Western Europe, taking account of congestions, to value storage products</p>
 <p>Reviewed adequacy assessment of capacity market mechanism, audited market model to justify intervention, and developed argumentation towards the EC</p>	 <p>Provided a Central-West Europe power market model for investment valuation purposes and supported the set-up of an in-house modelling team</p>	 <p>Used our European electricity market dispatch model and French capacity market model to forecast French capacity price in several scenarios</p>	 <p>Modeled the impact of EU ETS reform options for a group of energy companies, measuring emissions, prices, and auction revenues</p>	 <p>Modelled the welfare impact of the Interconnector through its effect on wholesale gas prices in the UK, Belgium, the Netherlands France and Germany</p>
<p><b>Multiple clients</b></p> <p>Multi-client study for six utilities companies, providing a target model for European power market design in the context of EC restructuring</p>	<p><b>Anonymous client</b></p> <p>Developed a comprehensive stochastic approach to model the weather impact as well as random outages or failures on the power markets</p>	 <p>Used a model of the Dutch electricity market to assess the impact of negative incentives for network congestion for the Dutch government</p>	<p><b>Anonymous client</b></p> <p>Developed a tailored asset model for an existing thermal plant operator, assessing the Iberian power market and the thermal asset</p>	<p><b>Anonymous client</b></p> <p>Modelled the evolution of congestion rents in a range of scenarios to capture the value of GB interconnectors associated with price volatility</p>

Source: FTI-CL professionals

# FTI-CL Energy has extensive experience in providing strategic advisory services to large industry players



### Strategy & Business Model Review

Currently providing business model validation including the identification of new business models and the future development of the market.



### Leading Global Utility

Working with the senior management of a leading global utility to evaluate the business opportunity for energy storage and demand aggregation, culminating in a review of 16 markets, their regulation, and potential acquisition targets.



### Emerging Utility Business Models

Identify and advise on the available market opportunity and potential business models for energy storage and demand response



### Cross Industry Digital Strategy Review

Led a detailed review and outside-in framework analysis of cross business unit digital strategy to help the client prioritise industry for its digital solution offering



### Lead Advisor Leading OEM

Lead advisor to chief strategy officer. Primary responsibility includes developing strategic roadmap and investment plan for the hybrid and energy storage markets, digital energy market, corporate PPAs, guarantee models, and solar market.



### Strategy & Business Model Review

Business model validation for a leading wind turbine OEM including the identification of new business models and the future development of the market, including service offerings and integrated energy solutions.



### Global Utility

Evaluated the energy storage potential presented by the connected EV market.



### Strategic Business Review

Developed an energy management strategy for a global utility, including smart meter/grid/home business, energy efficiency, renewable generation, clean technology, and carbon market strategy business propositions.



### Digital Energy Company

Evaluated different use cases for data stemming from EVs and charging stations with specific focus on the distributed network stability and system needs.



### Leading Technology Innovator

Performed global EVs market sizing through to 2025+, assessed of regulatory environment by region, market drivers and constraints, implications for battery suppliers (existing and potential types), opportunities for ancillary technologies and evaluation of the competitive landscape.



### Strategic advisor

Developed a new geographical and technological diversification strategy for an European IPP including progressive assessment of 41 markets and 3 technologies. Modelled IRRs of battery storage projects across Europe.



### Technical review of Battery R&D Company

Working for the board of an emerging clean energy co. bringing to market material science solutions to develop advanced energy storage solutions. Technology review, patent analysis, commercialisation and industrial plan.



### Electric Transportation & Storage Technology Co. Restructuring

Business review including company restructuring followed by running the sales process of the electric charging solutions provider for vehicles and industrial applications.



### Investment Memo for Energy Solutions Company

Wrote an IM for a company focused on energy efficiency, harvesting and storage that was looking to secure funding to deploy its technology in applications in transportation, energy storage and other large markets.



### Multi-Client Research

Performed analysis of current economics of EV/ PHEV / ICE ownership, a review of existing charging infrastructure and mapping of existing and emerging business models

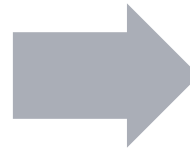
Note: FTI projects encompass projects employees worked on both while at FTI and at previous firms.

# Energy Community commissioned a study to assess generation capacity and recommendations on defining a CRM in WB6

- The Energy Community has attributed to Compass Lexecon and DLA Piper through a public tender procedure a study to **assess generation adequacy** for **six Western Balkans countries** (WB6), along with neighbouring countries and provide **recommendations on defining a capacity mechanism** in the WB6 given strong interdependencies between these power systems
  - Western Balkans countries: Albania, Bosnia and Herzegovina, Kosovo\*, Montenegro, North Macedonia and Serbia
- Our work is organised around **two main tasks**:

## Task 1: Analyses of system and generation adequacy

- Analysing whether there is an adequacy issue in the WB6 region
- Assessing whether this adequacy issue can be solved without a CRM intervention but through reform of the energy only market



## Task 2: Design of capacity mechanisms

- Identifying the high level options for design of such CRM, benchmarked with other European countries' experience;
- Discussing the pros and cons of different CRM design options based on multi criteria assessment;
- Evaluating the eligibility to the CRM of the different generation units depending on their environmental regulation compliance.





# Content of the presentation

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**1** Introduction: FTI-CL Energy and project scope

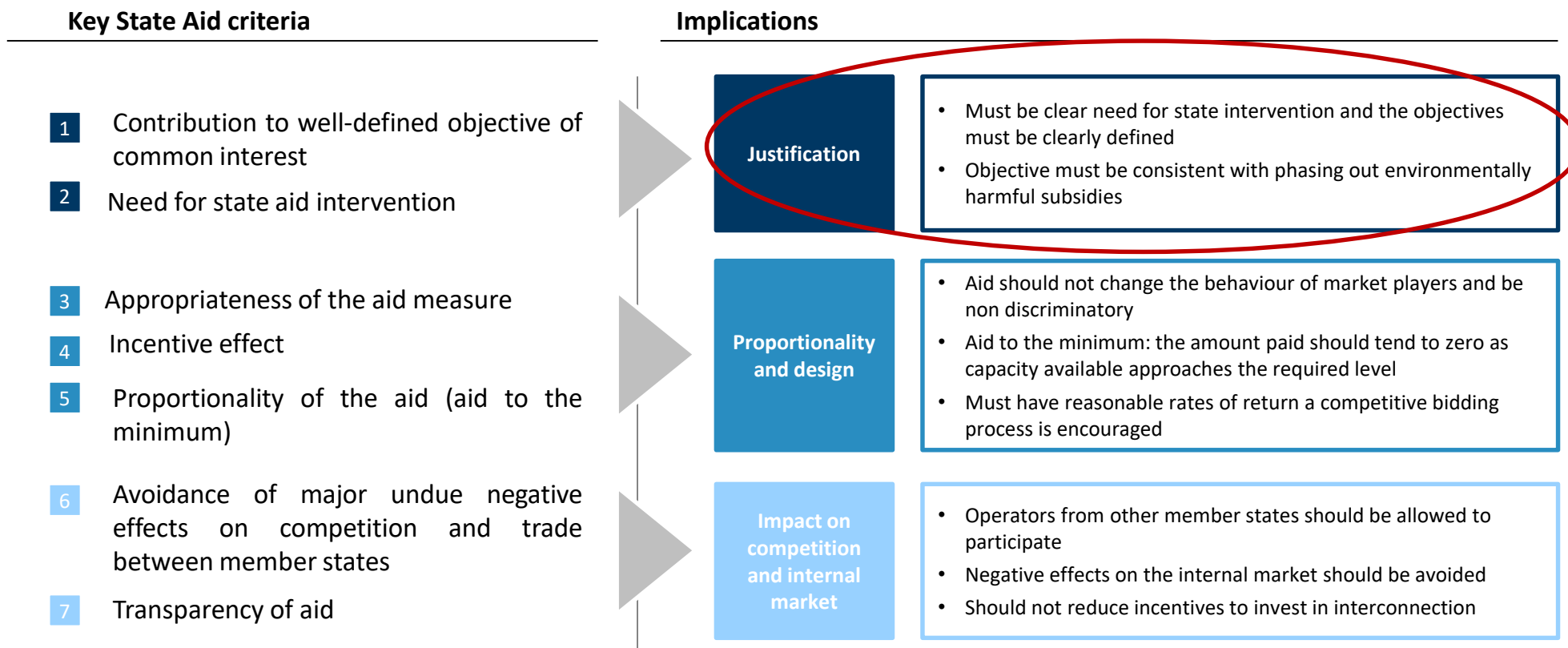
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# Performing an adequacy assessment is the first step of the EC State Aid guidelines for introduction of CRM

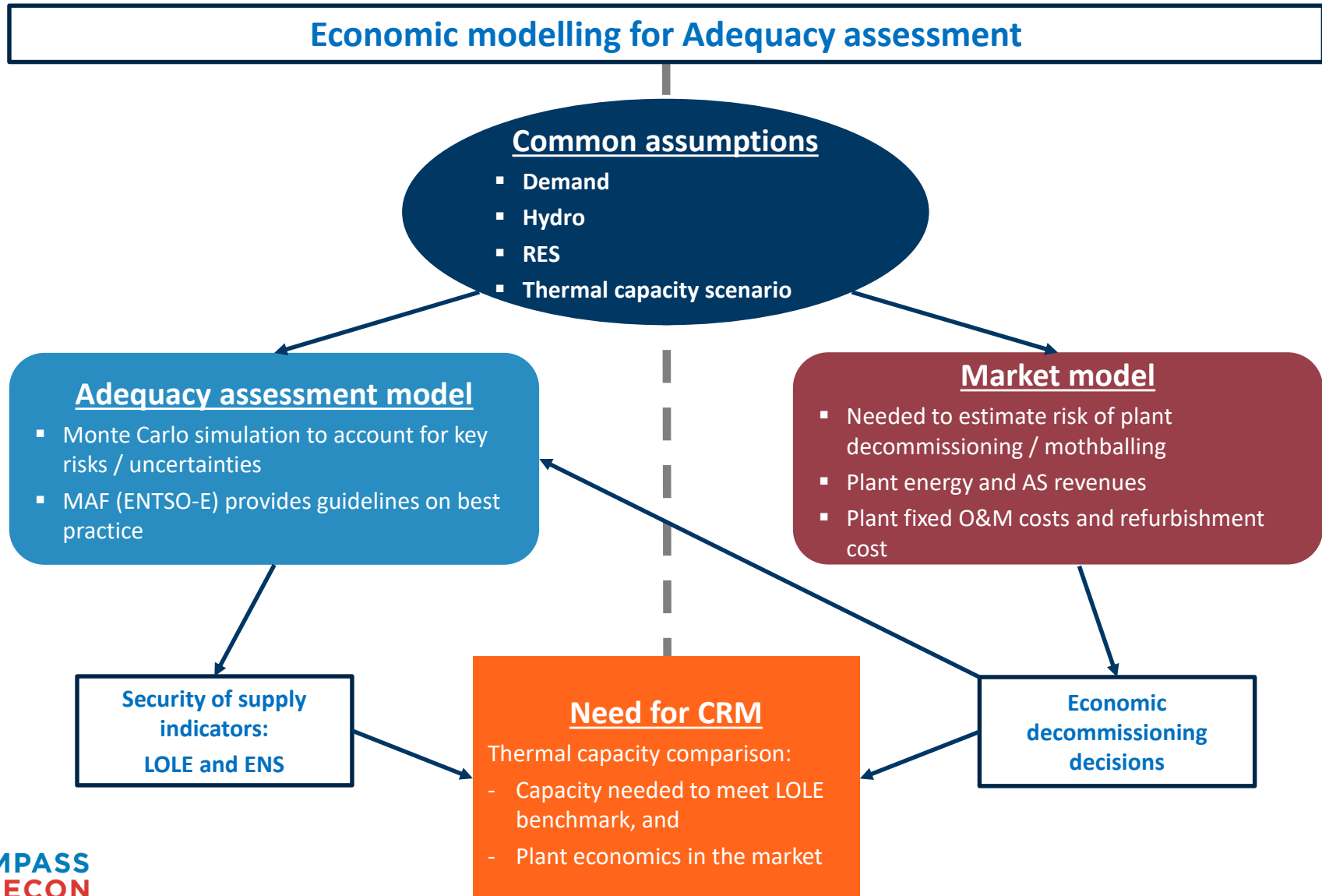
The European Commission has developed a **set of guidelines for the design of CRM to ensure their compliance with State Aid regulations**. Although these state aid regulations do not apply to WB6 countries, they are a useful reference for the design of CRM:



**A forward looking adequacy outlook taking into account the anticipated revenues of power plants needs to be conducted to justify the need of a CRM**

# The adequacy assessment requires both a system model and a market model to evaluate risk of plant decommissioning

- Assessing the future reliability of the system is done using the following combined modelling of **the Adequacy assessment model and Market model**:



# Aligning WB6 power markets regulations with the European target model brings future challenges to the WB6 power markets

The combination of new reforms on emissions standards, and further integration to the European energy target model highlights the necessity for the WB6 countries to further strengthen the regional cooperation and collaboratively implement and assess the impact of the following reforms ....

- 1 Wholesale power market reforms
- 2 Market coupling and cross-border interconnection within and with neighbouring countries
- 3 2030 RES target
- 4 Large Combustion Plan Directive (LCPD)
- 5 European Emission Trading Scheme (CO2 EU ETS)

.... To assess their impact on the future security of supply of the WB6 power markets

Assuming challenges 1, 2 and 3 would be first addressed, to capture the combined impact of the additional challenges (4, 5) on the future security of supply of the WB6 power markets, we design three scenarios on which we perform **an adequacy assessment**:

- **Base Case Scenario** - 1 + 2 + 3 + LCPD + TSOs Base Case
- **Energy Only Market EU ETS 2030 Scenario** - Base Case + Economic decisions + EU ETS from 2030 onwards
- **Energy Only Market EU ETS 2025 Scenario** - Base Case + Economic decisions + EU ETS from 2025 onwards

# Methodology and Assumptions are based on state-of-the-art modelling standard and latest data from TSOs & 2030 RES target

Monte Carlo Dispatch market optimisation based on detailed representation of power market fundamentals at an hourly granularity

## Geographic scope



- WB6 countries:** Detailed modelling on a plant-by-plant basis
- Countries interconnected with WB6 countries:** Aggregated modelling on a technology level based on ENTSOE forecasts
- Other countries:** Not modelled (only the import/export volumes with the "blue countries" are considered, based on historical data)

## Scenarios for market fundamentals based on latest TSOs' publications, 2030 RES target, and EU emission norms

- 3 2030 RES target, and EU emission norms
  - Supply outlook
  - Demand outlook
  - Cross-border capacity outlook
- 4 LCPD
- 5 EU ETS implementation

## Modelling framework

- 1 Fully competitive power market (e.g. SRMC bids and not indirect subsidies)
- 2 Perfect market coupling between countries
  - Plexos based dispatch model
  - Sample approach based on 3 representative weather samples \* 10 outage patterns

In order to assess the incentives sent by the current energy-only market to invest in new plants (if needed) or maintain existing plants, **future investments considered by the TSOs in their publications could be modified in our study**

## Time horizon

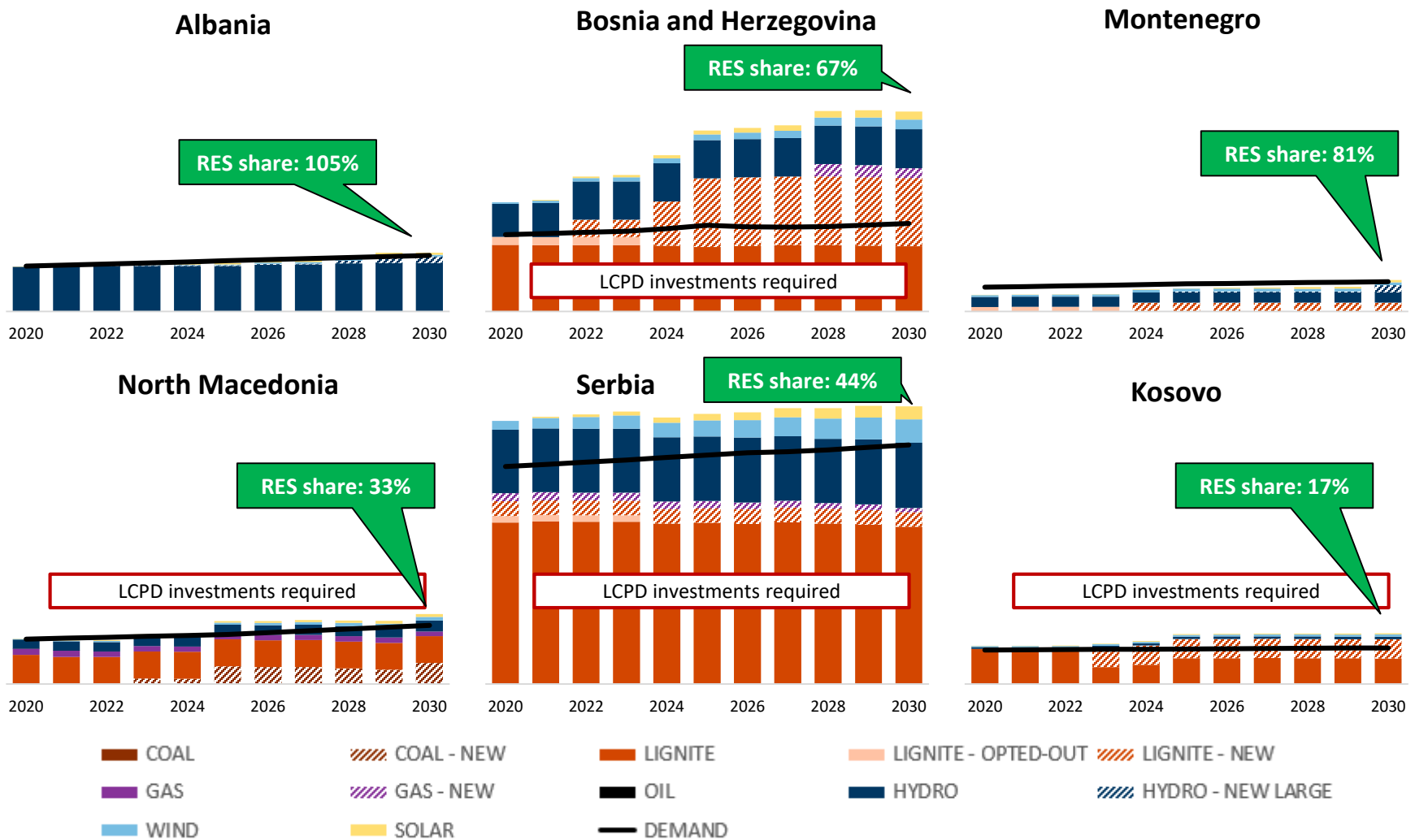


# Investments in most generating assets would be necessary to comply with latest LCPD while transiting towards 2030 RES target

On 1<sup>st</sup> January 2018, the implementation of the LCPD started in the Energy Community, requiring plants operators to comply or enter into the Limited Lifetime Derogation (20,000 hrs between 2018 and 2023)

In parallel, the Energy Community will transit to higher RES penetration reaching c50% of WB6 demand by 2030

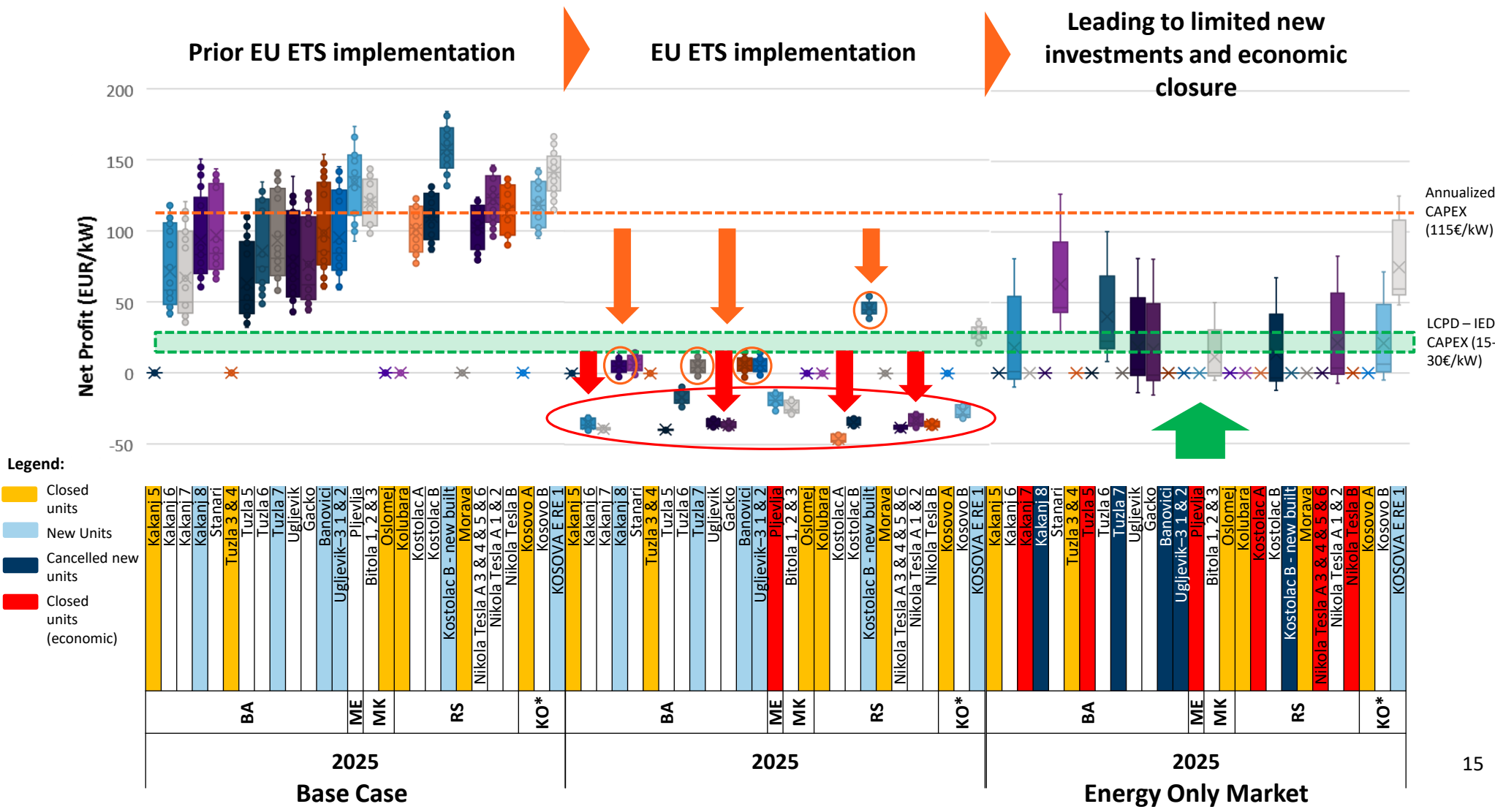
Annual generation and demand outlook (TWh) and 2030 RES share (% of national demand)



# Further integration into EU energy target model would significantly impact the economics of the WB6 power systems

As soon as the EU ETS is introduced, new and existing lignite plants would become unprofitable leading to limited new investments and economic closure of more than half of the existing lignite capacity by 2030

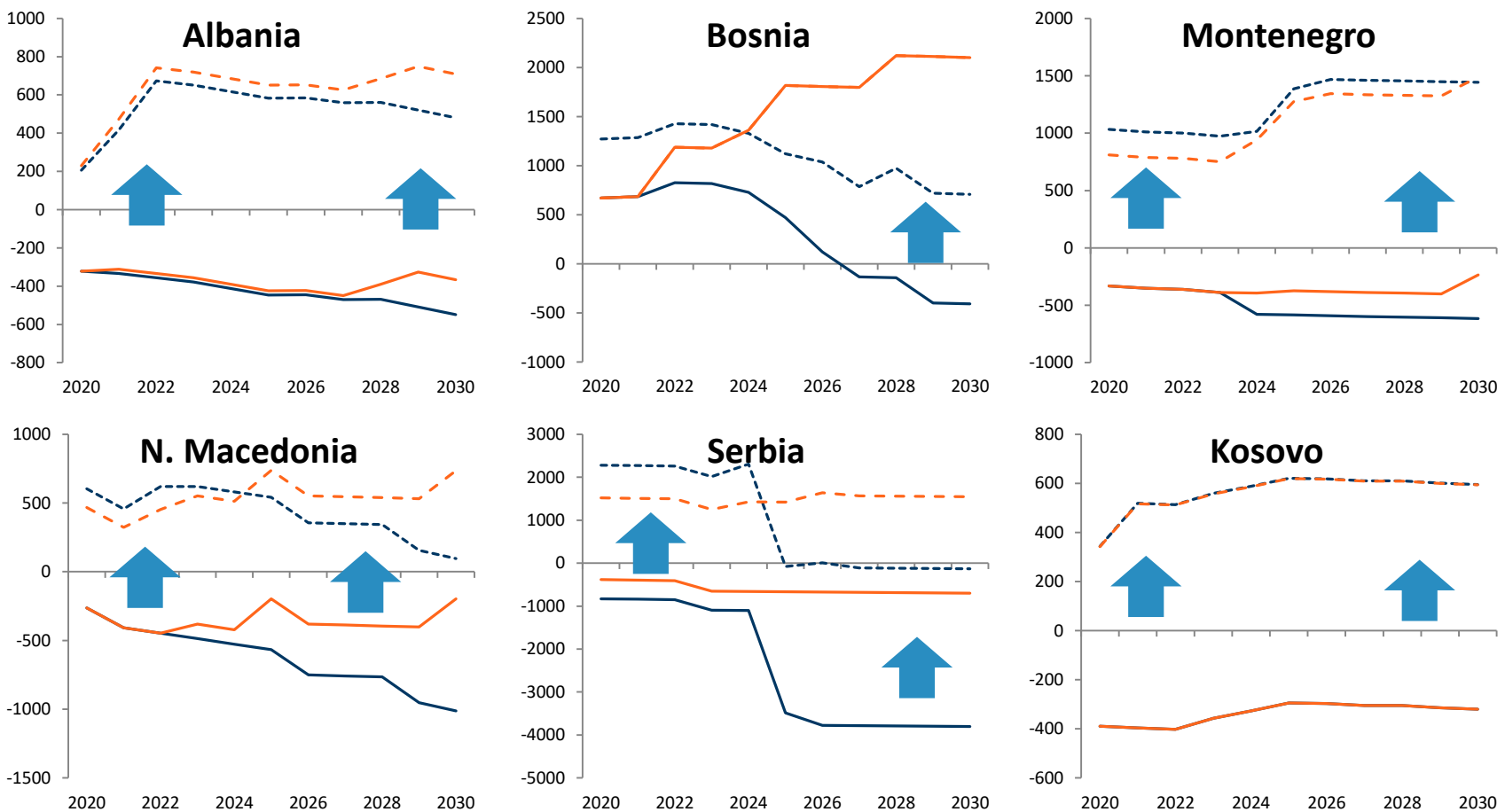
$$\text{Net Profit} = \text{Energy Revenue} + \text{Reserve Revenue} - \text{Variable Cost} - \text{Fixed Cost}$$



# Cross-border interconnections play a key role in WB6 power markets and would facilitate future system adequacy

While the WB6 power markets are currently net exporter on an annual basis, the adequacy analysis show that several WB6 countries rely on import capacity to ensure security of supply, thus strengthening the importance of cross-border interconnection in the region

Derated margin = Available capacity – (Peak load + Reserve), MW



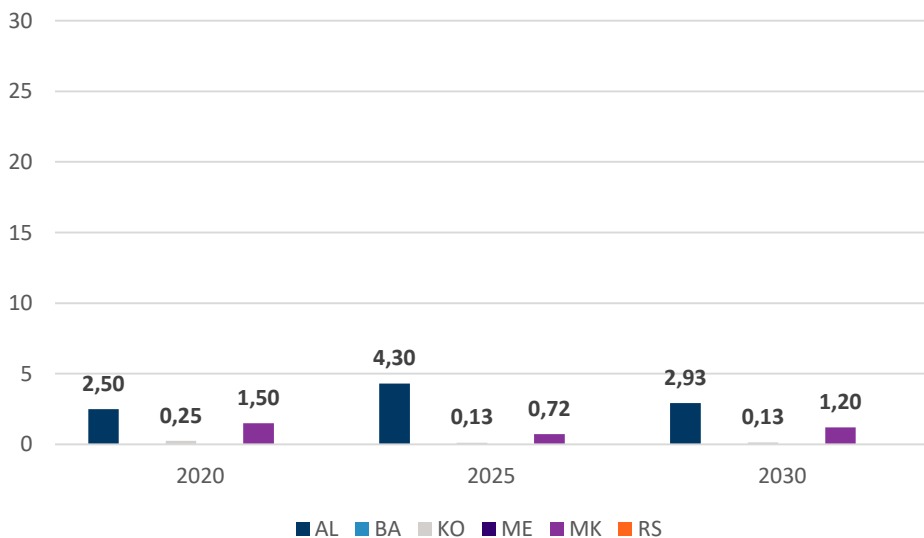


# In an Energy Only Market, under economic decommissioning scenarios, significant security of supply concerns arise

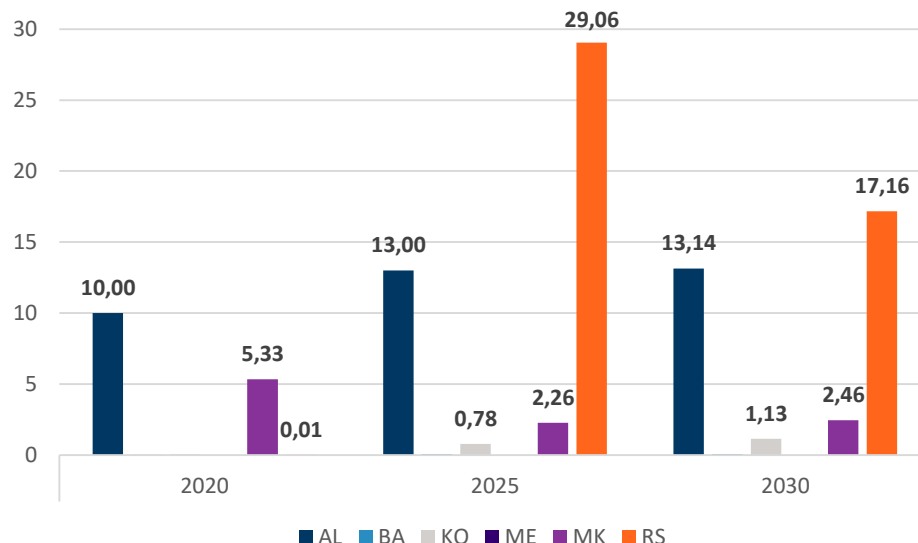
While the Base Case scenario meets the standard LoLE criteria of 3 hrs in all WB6 countries thanks to investment in new and existing plants, Economic modelling leading to no new investments and closure of existing lignite plants following the EU ETS implementation in 2025 (or 2030) would result in significant security of supply concern in most WB6 countries

- LoLE in Albania was not identified in the previous derating margin analysis since they tend not to occur during the peakiest hours but when hydro availability is limited
- Similarly, LoLE in MK was not identified since it relates to the combined probability of 3 Bitola units being unavailable at the same time (≈9h/year), which can result in loss of load.

Loss of Load Expectation for WB6 countries, in the Base case scenario (number of hours per year)



Loss of Load Expectation for WB6 countries, in the EU ETS 2025 scenario (number of hours per year)





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## A number of electricity market reforms are needed in the WB6 countries to ensure compatibility with EU framework

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### The market structure in WB6 does not currently have necessary prerequisites for introduction of CRMs as in the EU countries:

- **Limited missing money problem** - Generators mostly sell their energy internally to their supply branches or under PSO obligation with limited reliance on the market, no carbon pricing such as in EU countries limiting profits of thermal plants
- **Various existing state aid** - May make it difficult to justify additional aid through a CRM

### Electricity market reforms necessary to make WB6 compatible with EU Energy Target Model

- **Development of power exchanges and market coupling** to optimize the use of the existing transmission capacity
- **Implementation of carbon pricing** such as in EU, new environmental emission norms leading to investment requirements

### Regularization of existing state aid

- A number of **existing state aid measures would need to be reviewed** and modified to be compatible with the EU state aid regulation
- The two main objectives of common interest justifying the legal State Aid in the electricity sector are decarbonization and adequacy
- **Therefore, the existing state aid programs would need to be either phased out or converted into either an environmental or an adequacy State Aid (CRM)**

## Once WB6 electricity markets are compatible with the EU target model, a CRM under EC State Aid guidelines may be justified

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### Specificities of the adequacy problem in WB6

- **Reliance on imports** in Montenegro, Macedonia, Serbia and Kosovo during peak demand
- **Potential decommissioning** of existing lignite plants in Serbia (as well as in Bosnia and Macedonia), driven by introduction of EU ETS, **have a significant regional adequacy impact**
- Important **flexibility supply provided by hydro** fleet

### Possible future CRM models targeted to WB6 adequacy issues and compatible with EU state aid rules

#### *Strategic reserve vs market-wide approach*

- In general, Strategic Reserves is an appropriate approach to prevent decommissioning of capacity that is necessary for adequacy according to the EC CRM sector inquiry and EU regulation, however, the 550g CO<sub>2</sub>/kWh EPS would exclude the lignite plants from the CRM.
- Therefore, **the CRM model should address the transition of the energy system** away from lignite towards other capacity resources and **would need to be supported by a market-wide volume-based CRM** (e.g. a centralized capacity market)

#### *Regional vs national approach*

- **Regional nature of the adequacy issues in WB6 would call for a regional CRM approach.** A zonal CRM model similar to the CRM model approved by the EC in Italy or zonal CRMs in the US (PJM, New York, and New England) could be developed for WB6.
- In the absence of the regional CRM, national CRMs can be developed, but a **significant focus should be given on the cross-border participation**



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# Critical Thinking at the Critical Time <sup>TM</sup>

## **Fabien Roques**

Executive Vice President, Compass Lexecon

[froques@compasslexecon.com](mailto:froques@compasslexecon.com)

+33 1 53 05 36 29

## **Yves Le Thieis**

Senior Economist, Compass Lexecon

[ylethieis@compasslexecon.com](mailto:y lethieis@compasslexecon.com)

+33 1 53 05 36 26

## **Dmitri Perekhodtsev**

Vice President, Compass Lexecon

[DPerekhodtsev@compasslexecon.com](mailto:DPerekhodtsev@compasslexecon.com)

+33 1 53 05 36 24

## **Nicolas Hary**

Senior Analyst, Compass Lexecon

[NHary@compasslexecon.com](mailto:NHary@compasslexecon.com)

+33 1 53 05 36 63